Claims

[c1]　　　　I claim:

1. A method to specify drill-down relationships between a first report and one or more other reports in a computer language that includes query language syntax operable to interrogate one or more computer databases, the method comprising the following actions:

specify a first expression in the query language syntax of the computer language, the first expression operable to retrieve information from the one or more computer databases, the information being operable to be displayed in the first report; and

specify a second expression in the computer language to define one or more drill-down relationships between the information operable to be retrieved by the first expression and the one or more other reports.

[c2]　　　　2. The method of claim 1, further comprising the action of communicating the first expression to a relational database management system.

[c3]　　　　3. The method of claim 1, wherein the first and second expressions are specified in a computer application operable to interface with a relational database management system.

[c4]　　　　4. The method of claim 1, wherein the first expression comprises a column expression operable to retrieve a column or an operation on a set of columns from the one or more computer databases.

[c5]　　　　5. The method of claim 1, wherein the second expression is specified in the query language syntax of the computer language.

[c6]　　　　6. The method of claim 5, wherein the second expression comprises a column expression operable to generate a column of character strings.

[c7]　　　　7. A method to generate a first report having one or more drill-down relationships with one or more other reports, where the first report displays information retrieved from at least one computer database, the method comprising the following actions:

in response to a first database query language expression specified in a

block of source code, retrieve data from the at least one computer
database, where the data is operable for use in generating the first report;
and

in response to a second expression in the same block of source code,
establish the one or more relationships between the data and the one or
more other reports.

[c8]   8. The method of claim 7, the method further comprising the following actions:
provide a relational database management system to manage the at least
one computer database;
interrogate the relational database management system with the database
query language expression; and
retrieve a result set of data from the relational database management
system.

[c9]   9. The method of claim 7, the method further comprising the following actions:
provide a relational database management system to manage the at least
one computer database;
provide a reporting application to communicate with the relational
database management system;
interrogate the relational database management system with the database
query language expression; and
transfer a result set of data from the relational database management
system to the reporting application;
wherein the action of establishing the one or more relationships between
the data and the one or more other reports is performed by the reporting
application.

[c10]
10. A method to specify a drill-down relationship between a first report and a
second report using a query language having predefined syntax for
interrogating databases, the method comprising the following actions:
specify a first expression in the query language syntax, the first
expression being operable to retrieve data from a database into a result
set operable to be used to generate the first report; and

specify a second expression in the query language syntax, the second expression being operable to generate metadata to incorporate into the result set, where the metadata establishes the drill-down relationship between the first report and the second report.

[c11]   11. The method of claim 10, further comprising the following actions:
specify a third expression in query language syntax, the third expression being operable to retrieve data from the database into a second result set operable to be used to generate the second report;
provide an object that encapsulates the third expression; and
specify a name for the object.

[c12]   12. The method of claim 11, where the metadata comprises a character string that identifies the name of the object that encapsulates the third expression.

[c13]   13. The method of claim 10, where the first query language expression comprises a column expression.

[c14]   14. The method of claim 10, where the second query language expression comprises a column expression.

[c15]   15. The method of claim 10, where the metadata comprises at least one column of a table, where the column is labeled with a predefined keyword that identifies the column as containing drill-down metadata.

[c16]   16. The method of claim 10, where the first report has characteristics, where the method further comprises the following action:
specify a fourth query language expression operable to create additional metadata that defines characteristics of the first report.

[c17]   17. The method of claim 16, where the retrieved data comprises one or more columns, and the additional metadata specifies one or more of the columns to display in the first report.

[c18]   18. The method of claim 16, where the first report includes formatting characteristics, and the additional metadata specifies one or more of those formatting characteristics.

[c19]   19. A method to generate a set of linked reports comprising the steps of:

executing a first query language statement to generate a first result set comprising data and metadata, where the metadata defines a relationship between the data and a drill-down report;

binding the data to a first template operable to display a first graphical object on a graphical user interface, where the first graphical object comprises a plurality of distinctly visible elements corresponding to a plurality of distinct relational database entities, and where the interface is operable to generate an event if a user selects any one of the plurality of distinctly visible elements, whereby the particular element selected can be identified;

publishing a report containing the first graphical object on the graphical user interface; and

if the user makes a selection, then

identifying the selected element by mapping it to the corresponding data and metadata;

processing the metadata to identify the drill-down report to which the data is related;

executing a second query language command corresponding to the identified drill-down report, where the second query language command generates a second result set comprising further data;

binding the further data to a second template operable to display a second graphical object on the graphical user interface; and

publishing the drill-down report on the graphical user interface, where the drill-down report contains the second graphical object.

[c20]

20. A method to provide linked first and second reports to a user, the second report being provided in response to the user's selection of an element of a first report, the method comprising the actions of:

retrieve a first object that defines characteristics of the first report, the first object including a first query language statement operable to retrieve a first data set from a relational database, the first object also including a linking instruction that specifies a linking relationship between at least a

portion of the first data set and the second report, the first object further specifying a first report template to which the first data set is operable to be bound;

transmit the first query language instruction to a relational database management system;

retrieve the first data set from the relational database management system in response to the first query language instruction;

bind at least a portion of the first data set to the first report template;

publish the first report;

wait for the user to select an element of the first report;

if the user selects an element of the first report, map the user's selection to a corresponding portion of the first data set;

if the linking instruction specifies a linking relationship between the second report and the portion of the first data set corresponding to the user's selection, then

> retrieve a second object that defines characteristics of the second report, the second object including a second query language instruction operable to retrieve a second data set from a relational database, the second object further specifying a second report template to which the second data set is operable to be bound;
>
> retrieve the second data set from the relational database management system in response to the second query language instruction;
>
> bind the second data set to the second report template; and
>
> publish the second report.

[c21]   21. The method of claim 20, where the linking instruction also includes a parameter to pass to the second object and to modify the second query language instruction therein, the method further comprising the following action if the action of retrieving the second object is performed:

> translate the second query language instruction to incorporate the parameter passed by the linking instruction.

[c22]   22. A reporting apparatus for a relational database comprising:

a computer;

a plurality of report pattern objects residing on the computer, each object defining the characteristics of a report, including a query language statement operable to retrieve a result set from the relational database;

a data retrieving module operable to retrieve the result set specified by the query language statement;

a result set handling module operable to identify drill-down-report-specifying metadata in the result set; and

an event handling module operable to retrieve, in response to user requests, report pattern objects corresponding to drill-down reports specified in the metadata of the result set.

[c23]   23. The reporting apparatus of claim 22, further comprising an editing module operable to enable the editing of the report pattern objects.

[c24]   24. The reporting apparatus of claim 22, further comprising a translating module operable to incorporate parameters passed by the event handling module into the query language expressions of report pattern objects retrieved in response to user requests for drill-down reports.

[c25]   25. The reporting apparatus of claim 22, further comprising a reporting module operable to generate report code corresponding to the result set on a user interface.

[c26]   26. The reporting apparatus of claim 25, further comprising a presentation handler operable to display reports in accordance with the report code generated by the reporting module.

[c27]   27. The reporting apparatus of claim 22, wherein the data retrieving module comprises at least a portion of a relational database management system.

[c28]   28. A computer system on which a relational database application is running, the computer system comprising:

a plurality of linked report pattern objects containing query instructions operable to generate a result set constructed at least in part with data from a relational database;

a first logic circuit created by the relational database application, the first logic circuit being operable to retrieve one or more of the plurality of report pattern objects;

a second logic circuit created by the relational database application, the second logic circuit being operable to identify drill-down-report-specifying metadata in a result set obtained from a relational database; and

a third logic circuit created by the relational database application, the third logic circuit being responsive to user requests for drill-down reports,

whereby the computer system is operable, in response to user requests, to retrieve report pattern objects corresponding to the drill-down reports specified in the metadata of the result set.

[c29]   29. The computer system of claim 28, further comprising a fourth logic circuit created by the relational database application, the fourth logic circuit being operable to enable the editing of report pattern objects.

[c30]   30. The computer system of claim 28, further comprising a fifth logic circuit created by the relational database application, the fifth logic circuit operable to incorporate parameters specified in the drill-down-report-specifying metadata into the query language instructions of report pattern objects retrieved in response to user requests for drill-down reports.

[c31]   31. The computer system of claim 28, further comprising a sixth logic circuit operable to publish a report corresponding to the result set on a user interface.

[c32]   32. A system for generating linked reports comprising:

means for specifying drill-down relationships between reports;

means for publishing reports based on underlying data, where the reports contain a plurality of user-selectable graphical elements;

means for mapping user selections of graphical elements in published reports to a corresponding portion of the underlying data; and

means for identifying the drill-down relationships between reports.